

NIKKO POWER AMP



ALPHA 130

STEREO POWER AMPLIFIER

TYPE AND VOLTAGE

W-TYPE:	UL and CSA type	120V AC
E-TYPE:	NK-STD type (SILVER PANEL)	220/240V
E'-TYPE:	NK-STD type	220/240V

SERVICE MANUAL

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SPECIFICATIONS

AMPLIFIER SECTION

Continous Power Output Channel:

20 ~ 20000 Hz (8 ohms) more than 100 Watts
 20 ~ 20000 Hz (4 ohms) more than 100 Watts
 1000 Hz (8 ohms) more than 120 Watts
 1000 Hz (4 ohms) more than 120 Watts

T.H. Distortion, 8 ohms:

at Continous Power Output no more than 0.01%
 at 1 Watt Power Output no more than 0.01%

T.H. Distortion, 4 ohms:

at Continous Power Output no more than 0.03%

I.M. Distortion, 8 ohms:

at Continous Power Output no more than 0.01%
 at 1 Watt Power Output no more than 0.03%

IHF Power Bandwidth, (THD 0.05%) 8 ohms:

. 10 ~ 50 kHz

Damping Factor at 1000 Hz, 8 ohms:

. more than 50

Frequency Response, input, 8 ohms:

at 1 Watt Power Output 10 ~ 50 kHz ±0.2 dB

Input Sensitivity for 120 Watts Power Output:

MAIN IN 1V ± 2dB

Signal to Noise Ratio, IHF "A" Network:

MAIN better than 110dB

Signal to Noise Ratio, DIN Filter:

MAIN IN better than 90dB
 Channel Balance: no more than 1dB
 Residual Hum and Noise, 8 ohms: . . . no more than 0.5mV
 Idling Current: 20 ~ 60mA
 Midpoint Voltage: 0 ± 20mV
 Muting Delay Time: 3 ~ 7 seconds

GENERAL

Power Requirement:

W-TYPE	AC 120V, 60Hz
E-TYPE	AC 220/240V, 50Hz
E'-TYPE	AC 220/240V, 50Hz

Power Consumption: 310W (420 VA)

Ambient Temperature during Operation: -10 ~ 30°C

Dimensions:

Width	482 mm (19 inches)
Height	138 mm (5-1/3 inches)
Depth	344 mm (13-1/2 inches)

Weight, without package: 12 kg (26.5 lbs)

* Specifications are subject to change without notice.

PRECAUTIONS DURING SERVICING

1. Parts identified by the symbol parts are critical for safety. Replace only with same parts number specified.
2. Other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation.
These must also be replaced only with replacements.
Examples: RF converters, tuner units, RF cables, noise blocking capacitors, noise blocking filters, etc.
3. Use specified internal wiring.
 - a) Primary leads.
 - b) Wires covered with PVC tubing.
 - c) Double insulated wire.
4. Use specified insulating materials for hazardous live parts.
 - a) Insulation Taps.
 - b) Insulated Barriers (Spacers)
 - c) PVC Tubing.
 - d) Plastic screws for fixing microswitch (Especially in turntable).
 - e) Terminal strips.
5. When replacing the primary components (transformer, power supply cord, switch, switch by-pass capacitor,

etc.), wrap ends of wires securely about the terminals before soldering.

Where hand soldering is involved a minimum spacing below between terminals of uninsulated live parts of primary or supply circuitry through air or over surface is to be maintained.

110 and 120V appliance: more than 3 mm spacing

220V and 240V appliance:

more than 6 mm spacing

6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal resistors, rectifiers, etc.)
7. Check that replaced wires do not contact sharp edge or pointed parts.
8. Do not remain an electric conductive parts (screws, droplets, etc.) inside the appliance.

SAFETY RECHECK AFTER SERVICING

Confirm the specified insulation resistance between power plug prongs and externally exposed parts of the appliance is greater than 10M ohms, but for equipment with external antenna terminals (tuner, receiver, etc.) and is specified insulation resistance should be more than 2.2M ohms (ground terminals, in-output jacks, etc.)

BLOCK DIAGRAM

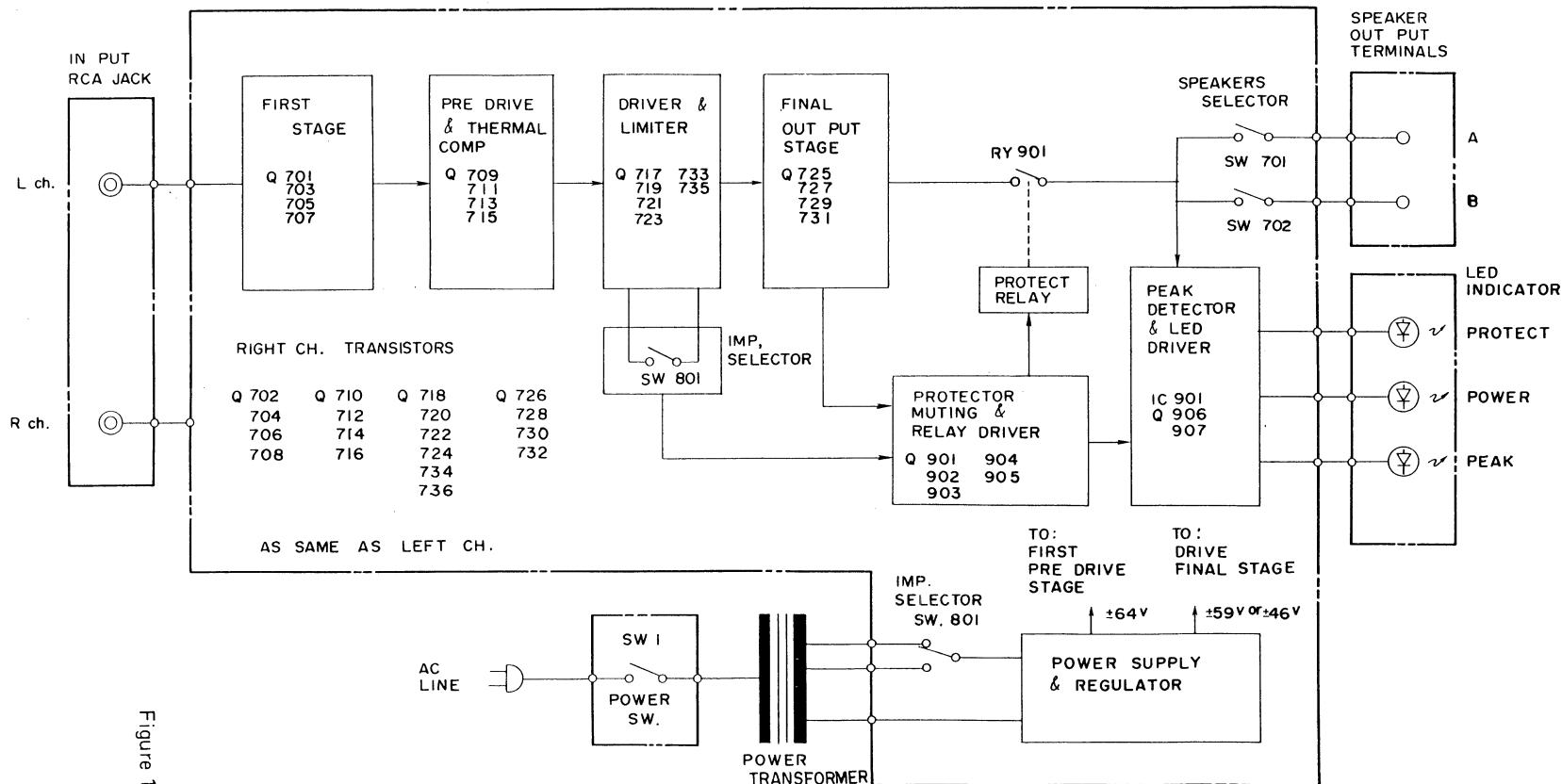


Figure 1

DISASSEMBLY

CABINET COVER REMOVAL

- Remove four tapping screws from the top of the unit.
- Remove four screws from both sides of the unit.
- Lift the cabinet cover away from the unit.

BOTTOM PLATE REMOVAL

- Remove nine tapping screws from the bottom of the unit as shown in Photo 1. (#1 – #12)
- Lift the bottom plate away from the unit.

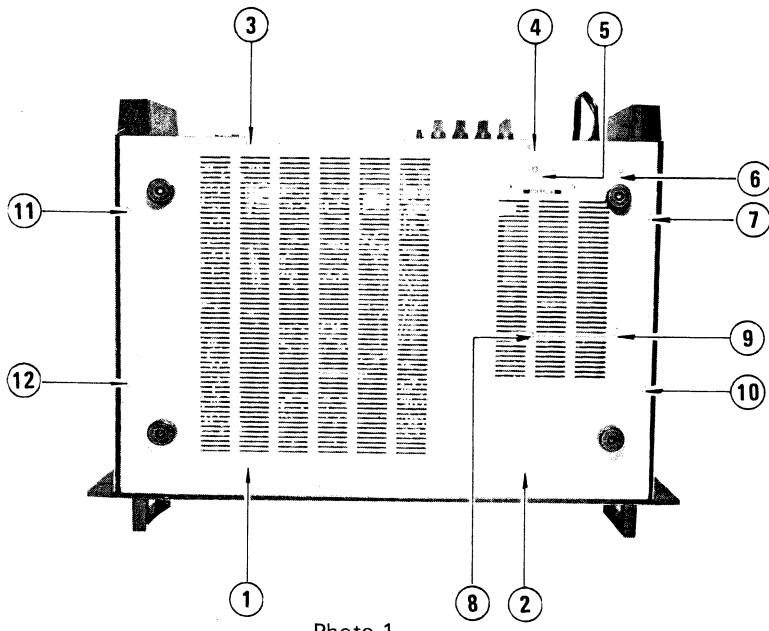


Photo 1

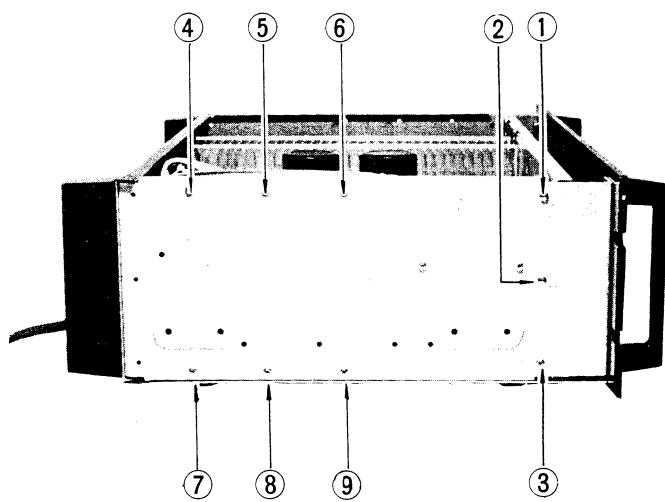


Photo 2

FRONT PANEL REMOVAL

- Remove three tapping screws (#1 – #3) from the left side of the unit as shown in Photo 2.
- Similarly remove three tapping screws from the right side of the unit.
- Remove the front panel away from the unit by pulling it forward.

POWER TRANSFORMER REMOVAL

- Remove the cabinet cover and the bottom plate.
- Disconnect all the cables from the power transformer.
- Remove six nuts (#4–#9) as shown in photo 2.
 - Remove Power Trace Holder as shown in Figure 2, #1 Photo 3.
 - Remove four nuts (#1–#4).
- Lift the power transformer away from the unit.

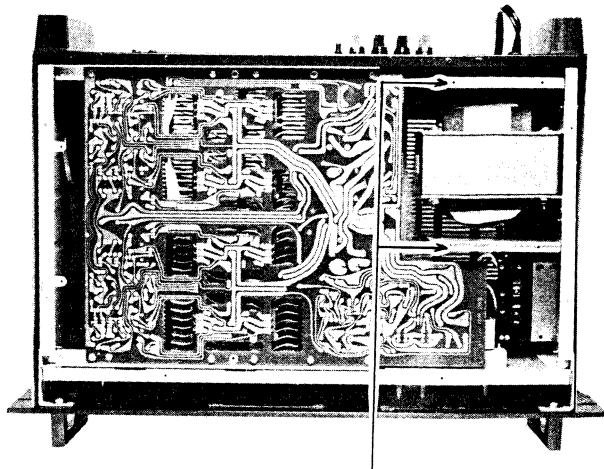


Photo 3

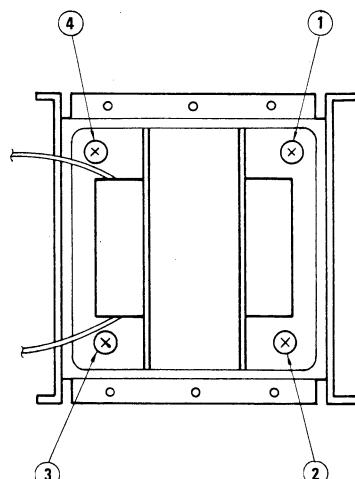


Figure 2

PARTS LOCATION

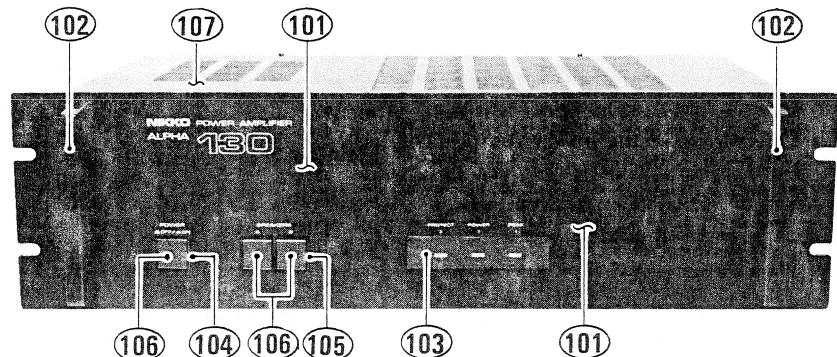


Photo 4

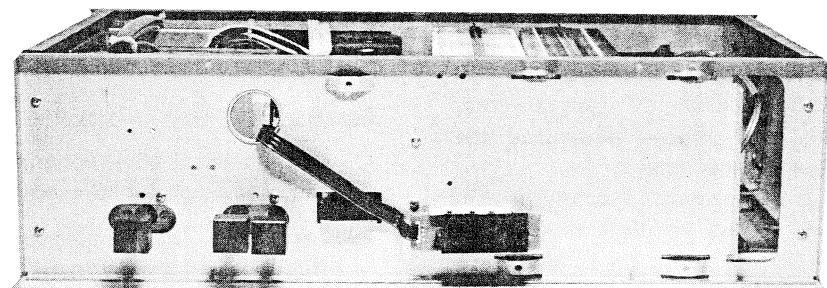


Photo 5

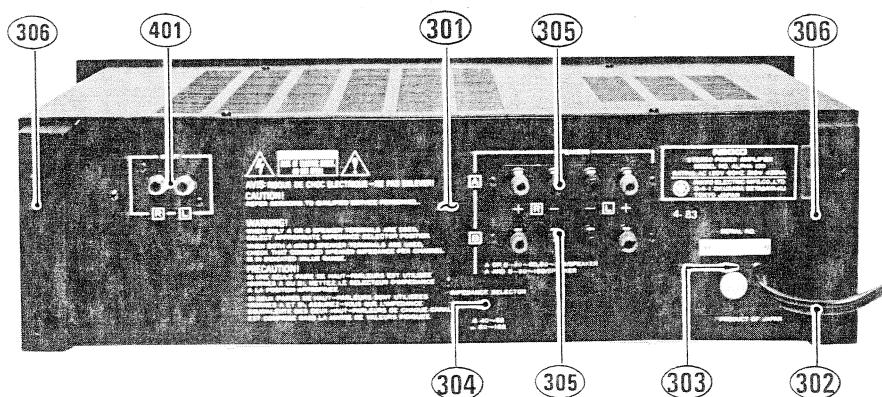


Photo 6

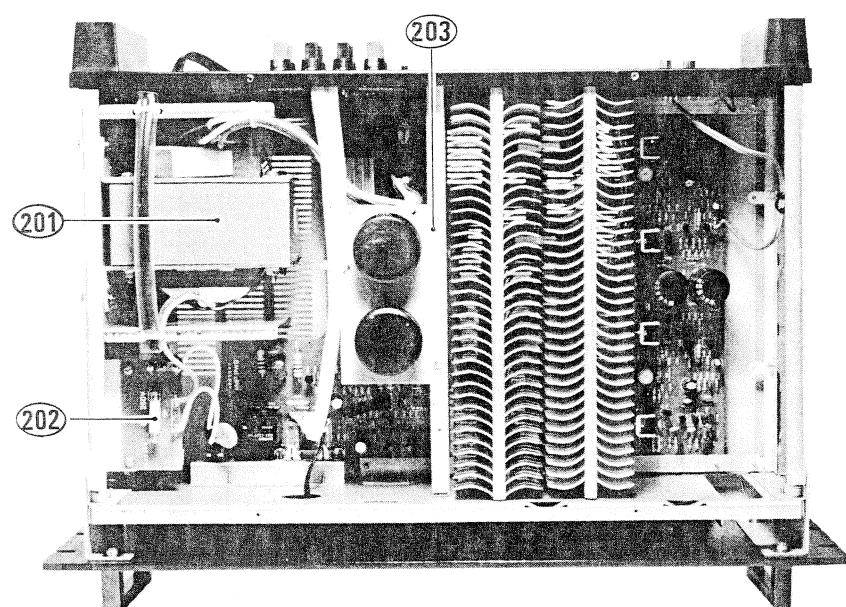


Photo 7

ALIGNMENT

ALIGNMENT PRECAUTIONS

1. As the ALPHA 130 is a power amplifier with large output power, it consumes much electrical power and a great amount of current flows in the power source line of the primary side. Therefore, in the case when it is connected to the source by an extension cord, the size of the extension cord should be equal or larger than that of the power source cord of the ALPHA 130. Otherwise, the voltage might be reduced or the extension cord might generate excessive heat because of the resistance which the cord has, then not only can proper alignment be done, but also it is very dangerous.

2. If the power sources are supplied to the ALPHA 130 and the instruments by branching off from one cord, the voltage is sometimes dropped down and the stability of the instruments goes down.
The ALPHA 130 and the instruments should be connected to the power sources by using independent cords. The ALPHA 130 must take the power source from AC outlet of the wall side.

3. As there are many parts which hold high voltages in the circuit and the parts inside of the ALPHA 130, be careful not to receive an electric shock. In the case of connecting and taking off the instruments, you must turn off the power switch of the ALPHA 130 before getting on the work.

4. When the circuit happens to be shorted by the drivers or test probes used for alignment through mistake, the circuit and the parts will be damaged. As the damage is larger than that of ordinary amplifiers and receivers, close attention is needed. It is advised that the turning driver, excluding the top part, should be wrapped with insulation tape or a driver made of plastic or some kind of insulating material should be used.

5. As the dummy load resistor generates heat while alignment, it gets very hot and you may be burnt if you touch it with bare hands. It is better if you can put the dummy load resistor in a place away from being touched, but the wire between the dummy load resistor and the amplifier should not be long. Contrive some method, like putting the dummy load resistor in a well ventilated box. Further, as more than 5 A current might flow in the wire connecting the dummy load resistor and the amplifier, at least larger than AWG #18 thick wire should be used.

TEST EQUIPMENT

Allow a minimum of 10 minutes warm-up for test equipment.

Maintain rated line voltage.

Audio Frequency Generator
Distortion Meter
Oscilloscope
AC Voltmeter
DC Voltmeter
2-Dummy Load Resistors, 8 ohms, 250 W

All the semi fixed resistors of the MAIN AMP PCB are set around the center position temporarily. (HVR R733 and HVR R734.)

IDLING CURRENT ADJUSTMENT

1. Connect the 8 ohms dummy load resistors to the left and right channel speaker terminals.
2. Connect the DC voltmeter across the wiring terminal No. 22 and 23 (left channel) or No. 24 and 25 (right channel). (see Photo 8)
3. Turning on the power switch of the ALPHA 130. Adjust the semi fixed resistor HVR R733 (left channel) or HVR R734 (right channel) so that the DC voltmeter indicates $18.2 \text{ mV} \pm 6.6 \text{ mV}$.
4. Turn off the power switch of the ALPHA 130 and remove the DC voltmeter.

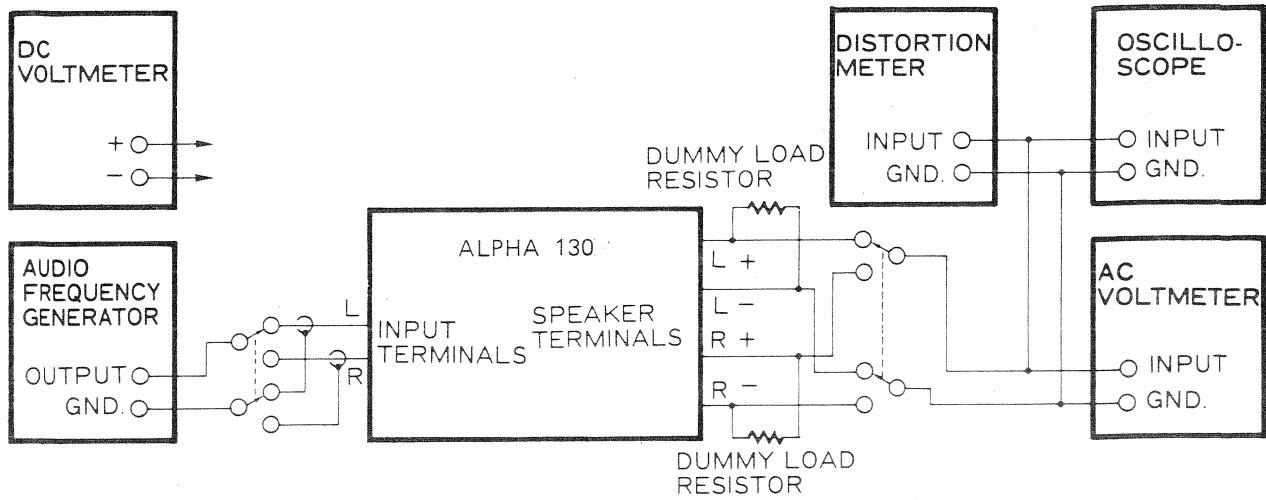


Figure 3 TEST EQUIPMENT HOOK-UP

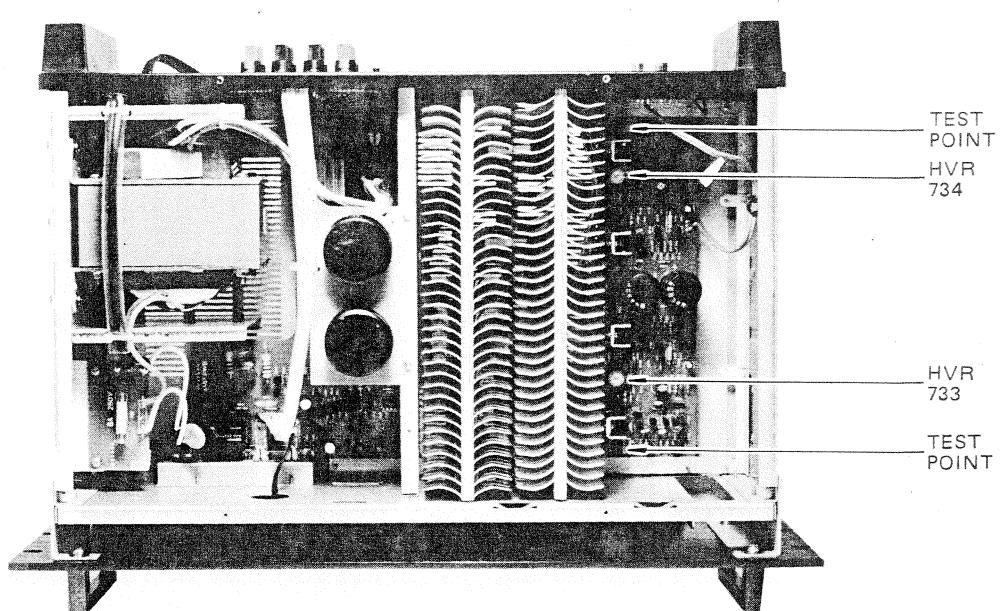


Photo 8 ADJUSTMENT POINTS

POWER TRANSISTORS MOUNTING ASSEMBLY

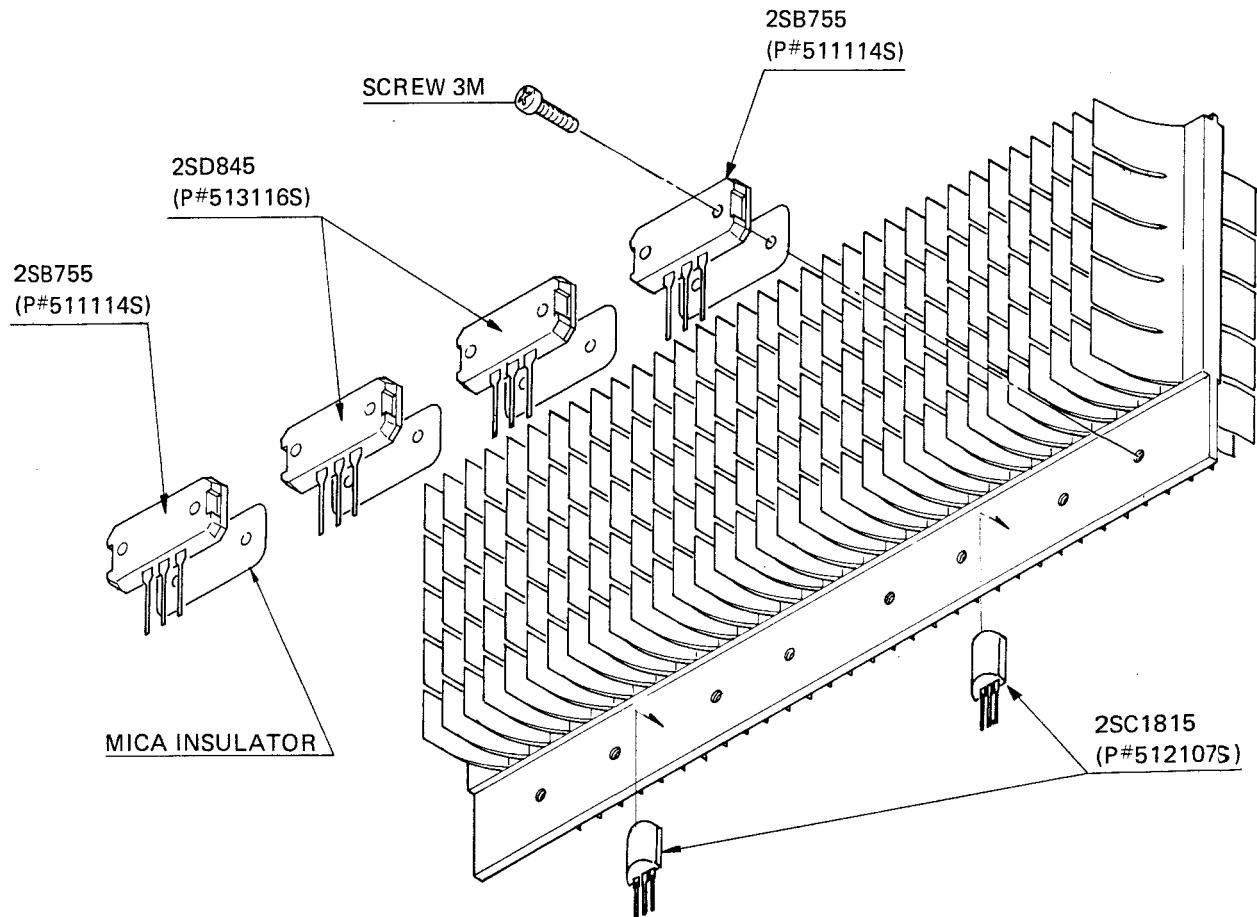


Figure 4

NOTE: For best heat conduction, use thermally conductive silicon grease between the power transistor and the mica insulator and between the insulator and the heat sink.

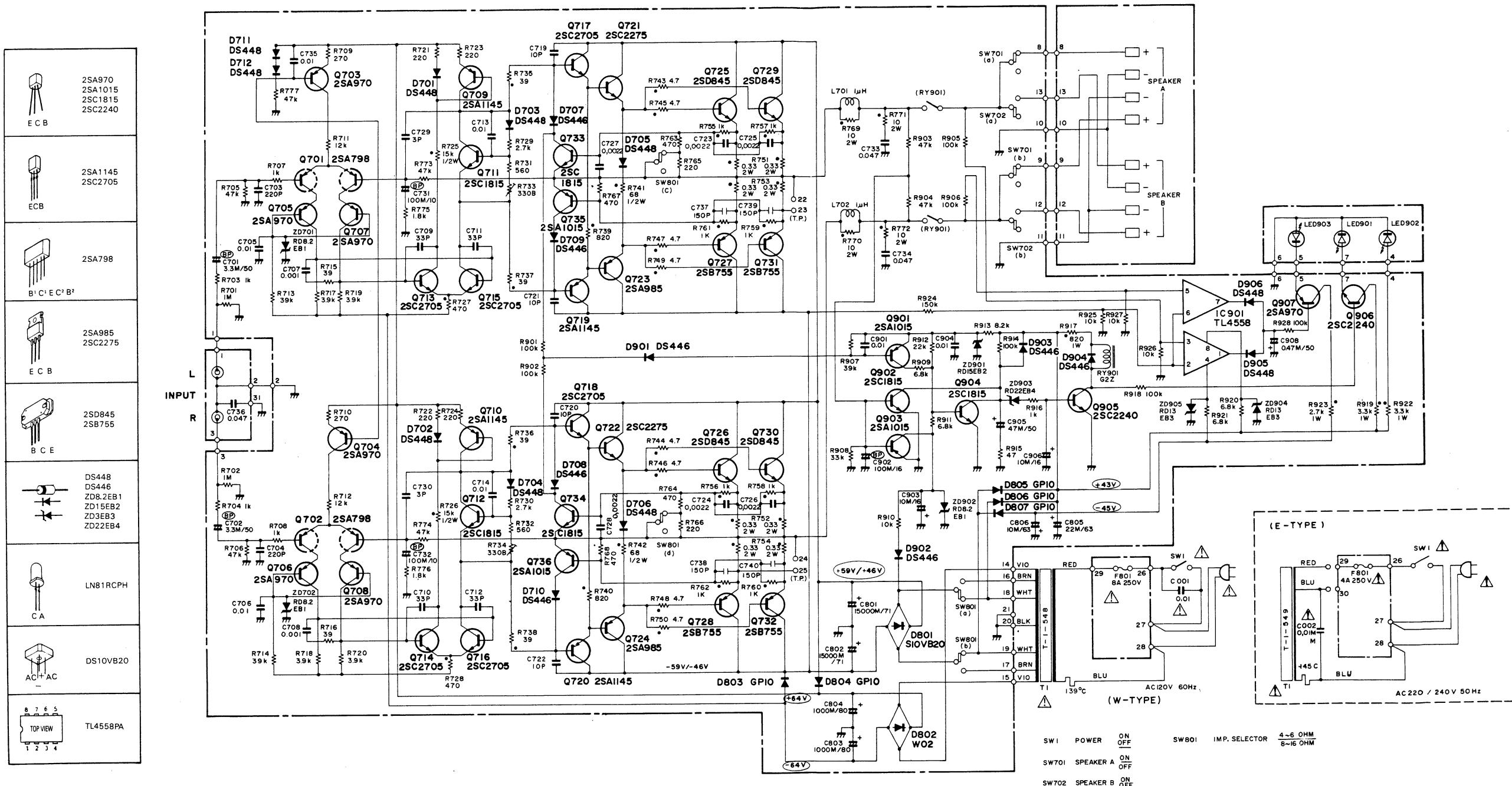
PRECAUTIONS FOR REPAIR SERVICE

Many of these items are included just as a reminder — they are normal procedures for experienced technicians. Short-cuts can be taken: but, often they cause additional damage to transistors, circuit components or the printed circuit board.

1. **Do not** bridge electrolytic capacitors with AC power. The resultant surges may damage solid state devices.
2. **Do not** bias the base of any transistor while voltage is being applied to its collector.

3. Replacements for output and driver transistors, if necessary, must be made from the same hfe group as the original type. Be sure to include this information when ordering replacement transistors.
4. If one output transistor burns out (open or shorts), always remove all output transistors in that channel and check the bias adjustment, the control and other parts in the network with an ohmmeter before inserting a new transistor. All output transistors in one channel will be destroyed if the base biasing circuit is open in the emitter end.

SCHEMATIC DIAGRAM



NOTES:

1. SCHEMATIC IS SUBJECT TO CHANGE WITHOUT NOTICE.
 2. RESISTANCE VALUES ARE IN OHMS.
K = 1,000; M = 1,000,000
 3. CAPACITANCE VALUES 1.0 AND ABOVE ARE IN pF OR μ F (P = pF, M = μ F), LESS THAN 1.0 ARE IN μ F. (ELECTROLYTIC CAPACITANCE VALUES ARE IN μ F/WV.)
 4. VOLTAGES ARE MEASURED TO CHASSIS, GROUND WITH A "DC VOLT-METER."
- V = VOLTAGES MEASURED WITH NO SIGNAL APPLIED.

SCHEMATIC SYMBOLS:

- (M) POLYESTER FILM CAPACITOR
- (BP) BIPOLE CAPACITOR
- W- NONFLAMMABLE RESISTOR

WARNING:

⚠ INDICATES SAFETY CRITICAL COMPONENTS.
FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

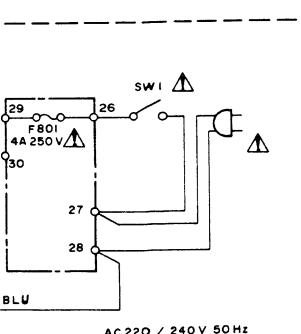
SERVICE INFORMATION

CAUTION: REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

1. EACH PRECAUTION TO BE FOLLOWED DURING SERVICING.
2. INDICATES SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY. REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.
3. BEFORE RETURNING THIS APPLIANCE TO THE CUSTOMER, YOU MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT.

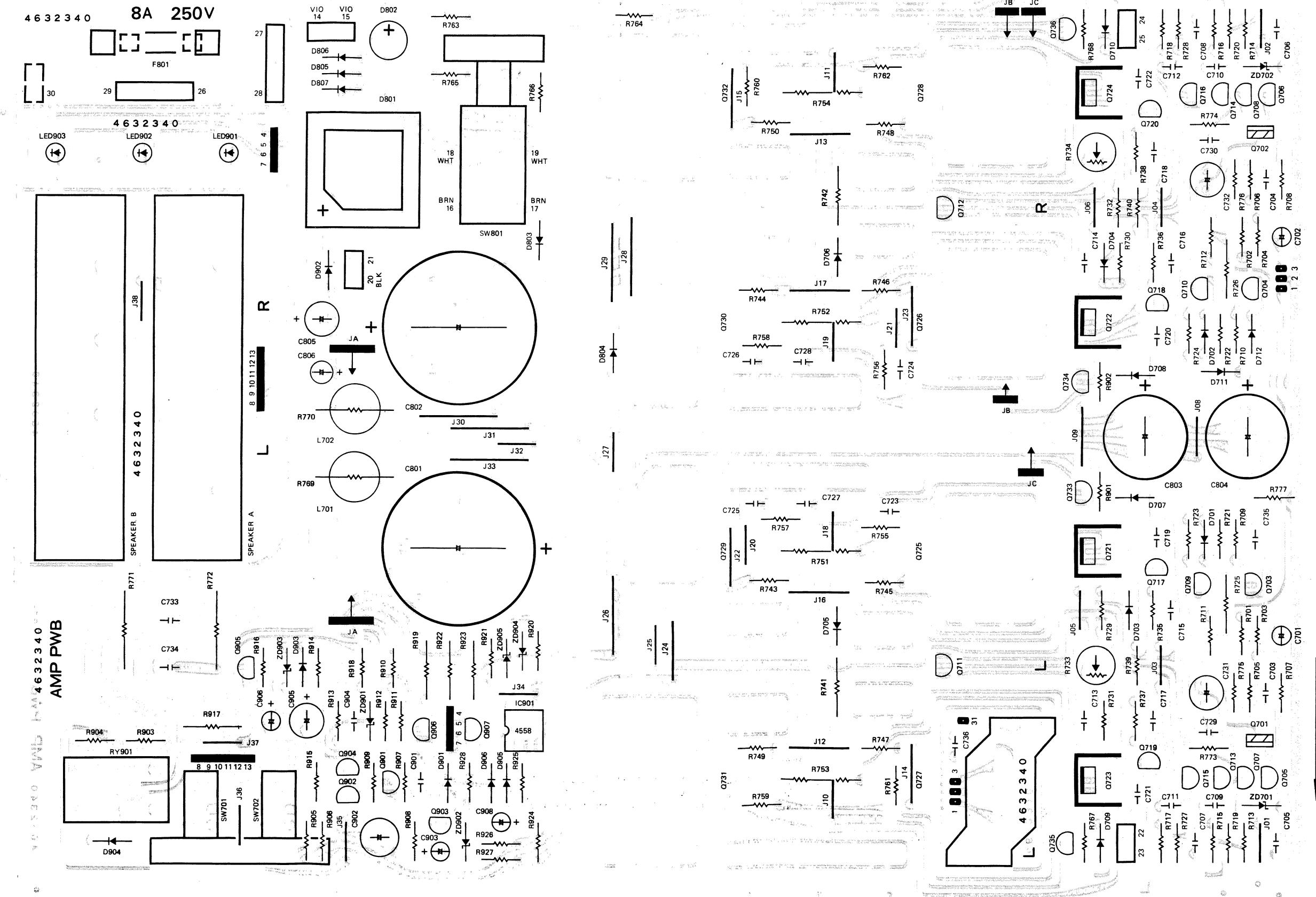
SW1 POWER ON OFF
SW701 SPEAKER A ON OFF
SW702 SPEAKER B ON OFF

SW801 IMP. SELECTOR 4~6 OHM
8~16 OHM



(W-TYPE)
AC 120V 60Hz
(E-TYPE)
AC 220 / 240 V 50 Hz

P.C. BOARD (BOTTOM VIEW)



PARTS LIST

1. * The KEY NUMBER (#) marked with a (*) on parts list relate to number of three digits with a (C). (Photo 4 ~ 7)
2. + Numerals in file indicate the quantity of parts used in one type.
3. ++ TR : Transistor
FET : Field effect transistor
VR : Volume control (Variable resistor)
RES : Carbon film fixed resistor
MO-RES : Metal oxide film fixed resistor
CEM-RES : Cemented wirewound fixed resistor
FP : Flame proof
C-CAP : Ceramic capacitor
E-CAP : Aluminum electrolytic capacitor
M-CAP : Polyester film capacitor
S-CAP : Polystyrene film capacitor
T-CAP : Tantalum electrolytic capacitor
BP-CAP : Bipolar electrolytic capacitor
LC-CAP : Low current leakage electrolytic capacitor.

4. Assemblies and parts are subject to change without notice.

5. Parts ordering procedure:

A. DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER.
(these are control # for the factory only)

B. Include in any order

- a. Part number.
- b. Part description.
- c. Model number.

(any of the above lacking from an order may delay shipment of that order.)

CAUTION:

The mark, the KEY NO. and the SYMBOL NO. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

KEY NO.	SYMBOL NO.	TYPE W E E'	DESCRIPTION ++	PART NO.
(PACKING MATERIALS & ACCESSORIES)				
001a	1 - 1		Carton box	9826880
001b	- 1 -		Carton box	9826890
002	1 1 1		Pad, styrol	9840970
003	1 1 1		Sack polythylene cloth	9640740
004	1 1 1		Sack polythylene cloth #13	9640320
005a	1 - -		Manual, instructions - English and French	960439E
005b	1 1		Manual, instructions - in five different languages	960439K
006	1 1 1		Cord, RCA phono pin plug 2T-75	961016A
(CABINET ASSEMBLY)				
*101a	1 - 1		Panel, front - Black	7886580
*101b	- 1 -		Panel, front - Silver	7886590
*102a	2 - 2		Handle - 100B - BLACK	7490190
*102b	- 2 -		Handle - 100S - SILVER	7490350
*103	1 1 1		Window, panel smoke	7803250
*104	1 1 1		Guide, button - 1P18	7402550
*105	1 1 1		Guide, button - 2P18	7402560
*106a	3 - 3		Button, push M18BK power/speakers	7852300
*106b	- 3 -		Button, push M18SL power/speakers	7853940
*107	1 1 1		Cover, top	7821110
108	1 1 1		Plate, bottom	7328860
109	4 4 4		Foot, polythylene - TG	7401350
(CHASSIS ASSEMBLY)				
*202a F801	1 - -		Fuse - 8A 250V	4700760
*202b F801	- 1 1		Fuse - 4A 250V	4721020
*201a	1 - -		Transformer, power T-1-548 AC120V	1105480
*201b	- 1 1		Transformer, power T-1-549 AC220V, 240V	1105490
*203	1 1 1		Supporter, capacitors	9003480
(BACK PLATE ASSEMBLY)				
*301a	1 - -		Plate, back - (W)	7328770
*301b	- 1 1		Plate, back - (E)	7328780
*302a	1 - -		Cord, AC line - STP - 2	606012A
*302b	- 1 1		Cord, AC line - CEE - 2T	600508A
*303	1 1 1		Bush, power cord - SR - 4N - 4	7400690
*304	1 1 1		Button, push P5 (Impedance Selector)	7401550
*305	2 2 2		Terminal, speakers - screw type 4P	4450620
*306	2 2 2		Block, terminal guard	7401860
(AMP ASSEMBLY)				
	1 - -		Switch, push - SDL - 1P - power	4042520
	- 1 1		Switch, push - ESB90179S - power	4041600
	1 1 1		C-CAP 0.01μF	239103A
Q725,726				
Q729,730	4 4 4		TR 2SD845	513116S
Q727,728				
Q731,732	4 4 4		TR 2SB755	511114S

KEY NO.	SYMBOL NO.	TYPE W E E'	DESCRIPTION ++	PART NO.
(AMP PC BOARD ASSEMBLY) (POINTER SECTION)				
*401	1 1 1		Terminal, RCA phono pin jack-2P	4442070
(AMP SECTION)				
SW701,702	1 1		Switch, twin push - SUF24 - Speakerst	4041590
Q701,702	2 2 2		TR 2SA798	5140865
Q703	~ 708	6 6 6	TR 2SA970	514086S
Q735,736	2 2 2		TR 2SA1015	510102S
Q709,710				
Q719,720	4 4 4		TR 2SA1145	510137S
Q723,724	2 2 2		TR 2SA985	510118S
Q711,712				
Q733,734	4 4 4		TR 2SC1815	512107S
Q713	~ 718	6 6 6	TR 2SC2705	512152S
Q721,722	2 2 2		TR 2SC2275	512152S
D711,712				
D701				
~ D706	8 8 8		Diode DS448	501026S
D707				
~ D710	4 4 4		Diode DS446	501028S
ZD701,702	2 2 2		Zener diode RD82EBI	502052S
L701,702	2 2 2		Choke coil, 1uH	1210960
R733,734	2 2 2		Semi variable volume SR 19R B330 ohm	4301450
R751				
~ 754	4 4 4		CEM-RES RG22 0.33 ohm 2W x 2	382339P
R769				
~ R772	4 4 4		FP-MO-RES 2W 10 ohm	362100L
R741,742	2 2 2		FP-MO-RES 1/2W 68 ohm	329680L
R725,726	2 2 2		FP-MO-RES 1/2W 15 Kohm	329153L
R749,750				
R743				
~ R748	8 8 8		FP-RES 4.7Ω 1/4W	328478L
R735				
~ R738	4 4 4		FP-RES 39Ω 1/4W	328390L
R727,728				
R767,768	4 4 4		FP-RES 470Ω 1/4W	328471L
R739,740	2 2 2		FP-RES 820Ω 1/4W	328821L
R760,761				
R762,755				
R756,757				
R758,759	8 8 8		FP-RES 1KΩ 1/4W	328102L
R715,716	2 2 2		RES 39ohm 5% 1/4W	328390J
R766,721				
R722,723				
R724,765	6 6 6		RES 220ohm 5% 1/4W	328221J
R709,710	2 2 2		RES 270ohm 5% 1/4W	328271J

KEY NO.	SYMBOL NO.	TYPE W E E'	DESCRIPTION ++					PART NO.
			DESCRIPTION ++					
R763,764	2 2 2	RES	470ohm	5%	1/4W		328471J	
R731,732	2 2 2	RES	560ohm	5%	1/4W		328561J	
R703,704								
R707,708	4 4 4	RES	1Kohm	5%	1/4W		328102J	
R775,776	2 2 2	RES	1.8Kohm	5%	1/4W		328182J	
R729,730	2 2 2	RES	2.7Kohm	5%	1/4W		328272J	
R717								
~ R720	4 4 4	RES	3.9Kohm	5%	1/4W		328392J	
R711,712	2 2 2	RES	12Kohm	5%	1/4W		328123J	
R713,714	2 2 2	RES	39Kohm	5%	1/4W		328393J	
R705,706								
R773,774								
R707	5 5 5	RES	47Kohm	5%	1/4W		328473J	
R701,702	2 2 2	RES	1Mohm	5%	1/4W		328105J	
C731,732	2 2 2	BP-CAP	100uf	10V			215130N	
C701,702	2 2 2	BP-CAP	3.3uf	50V			215513N	
C729,730	2 2 2	C-CAP	3pF	500V			234309D	
C719								
~ C722	4 4 4	C-CAP	10pF	500V			234100K	
C709								
~ C712	4 4 4	C-CAP	33pF	500V			234330K	
C737								
~ C740	4 4 4	C-CAP	150pF	50V			232151K	
C703,704	2 2 2	C-CAP	220pF	50V			232221K	
C723								
~ C728	4 4 4	C-CAP	0.0022MF	50V			231222K	
C733,734	2 2 2	M-CAP	0.047MF	250V			274473K	
C707,708	2 2 2	M-CAP	0.001MF	50V			222102K	
C705,706								
C713,714	5 5 5	M-CAP	0.01MF	50V			222103K	
HC (PROTECTOR SECTION)								
RY901	1 1 1	RELAY	G2Z-222P DC24V				1700300	
Q907	1 1 1	TR	2SA970				510103S	
Q901,903	2 2 2	TR	2SA1015				510102S	
Q902,904	2 2 2	TR	2SC1815				512107S	
Q905,906	2 2 2	TR	2SC2240				512102S	
IC901	1 1 1	IC	TL4558P				518129S	
D905,906	2 2 2	D	DS448				501026S	
D901								
~ D904	4 4 4	D	DS446				501028S	
ZD902	1 1 1	Zener diode	RD8 2EB1				502052S	
ZD904,905	2 2 2	Zener diode	RD13EB3				502063S	
ZD901	1 1 1	Zener diode	RD15EB2				502050S	
ZD903	1 1 1	Zener diode	RD22EB4				502059S	

KEY NO.	SYMBOL NO.	TYPE W E E'	DESCRIPTION ++					PART NO.
			DESCRIPTION ++					
R917	1 1 1	FP-MO-RES	1W	820Kohm				361821L
R919,922	2 2 2	FP-MO-RES	1W	3.3Kohm				361332L
R923	1 1 1	FP-MO-RES	1W	2.7Kohm				361272L
R915	1 1 1	RES	47ohm	5%	1/4W			328470J
R916	1 1 1	RES	1Kohm	5%	1/4W			328102J
R909,911								
R920,921	4 4 4	RES	6.8Kohm	5%	1/4W			328682J
R913	1 1 1	RES	8.2Kohm	5%	1/4W			328822J
R910,925								
R926,927	4 4 4	RES	10Kohm	5%	1/4W			328103J
R912	1 1 1	RES	22Kohm	5%	1/4W			328223J
R908	1 1 1	RES	33Kohm	5%	1/4W			328333J
R907	1 1 1	RES	39Kohm	5%	1/4W			32893J
R903,904	2 2 2	RES	47Kohm	5%	1/4W			328473J
R928,905								
R906,901								
R902,914								
R918	7 7 7	RES	100Kohm	5%	1/4W			328104J
R924	1 1 1	RES	150Kohm	5%	1/4W			328154J
C903,906	2 2 2	E-CAP	10uF	16V				211220S
C908	1 1 1	E-CAP	0.47uF	50V				211505S
C905	1 1 1	E-CAP	47uF	50V				211525S
C902	1 1 1	BP-CAP	16R100					21523ON
C901,904	2 2 2	C-CAP	0.01MF	50V				231103K
(LEAD SECTION)								
LED901								
~ LED903	3 3 3	LED	LN81RCPH					5060750
SW801	1 1 1	Switch push	SDU-4P-Impedance selector					404620
D801	1 1 1	Diode	S10VB20					560158S
D802	1 1 1	Diode	W02					560611S
D803								
~ D807	5 5 5	Diode	GP10-4002					560166S
C806	1 1 1	10μ	63V					211620S
C805	1 1 1	22μ	63V					211622S
C801,802	2 2 2	15000μ	71V					210120
C803,804	2 2 2	1000μ	80V					210130

SEMICONDUCTOR DATA

DEVICE TYPE	APPLICATIONS	STRUCTURE [†]	MAXIMUM RATINGS Absolute-Maximum Values: (TA = 25°C unless otherwise specified)							ELECTRICAL CHARACTERISTICS Typical Values: (TA=25°C unless otherwise specified)										MANUFACTURER	
			Collector-to-Base Voltage VCBO (V)	Emitter-to-Base Voltage VEB0 (V)	Collector Current IC (mA)	Collector Dissipation PC (mW)	Junction Temperature TJ (°C)	Collector Cutoff Current I _{CBO} (uA)	V _{CB} (V)	h _{FE}	V _{CE} (V)	I _C (mA)	V _{CE(sat)} (V)	IC (mA)	IB (mA)	f _T f _{ob*} (MHz)	V _{CE} (V)	V _{CB*} (V)	I _E (mA)	I _{C*} (mA)	Output Capacitance Cob (pF)
2SA798 (F, G)	AF, Low noise diff. amp.	PNP Si-EP	-70	-5	-100	200/unit	125	-0.1 max.	-50	250 ~ 800	-6	-1	-0.6 max.	-10	-1	100	-6	-1*	3	Dual transistor	MITSUBISHI
2SA970 (GR, BL)	AF, Low noise	PNP Si-E	-120	-5	-100	300	125	-0.1 max.	-120	200 ~ 400	-6	-2	-0.3 max.	-10	-1	100	-6	-1*	4		TOSHIBA
2SA1015 (Y, GR)	AF, General	PNP Si-E	-50	-5	-150	400	125	-0.1 max.	-50	120 ~ 400	-6	-2	-0.3 max.	-100	-10	80 max.	-10	-10*	7		TOSHIBA
2SA1145	AF	PNP Si-E	-150	-5	-50	800	150	-0.1	-150	80 ~ 240	-5	10	-1.0	-10	1	200	-5	-10	25	Complementary to 2SC2705	TOSHIBA
2SA985 (P, Q)	AF, Power amp.	PNP Si-E	-120	-5	-1.5A	25W (Tc=25°C)	150	-1	-120	100 ~ 320	-5	-300	-2 max.	-1A	-100	180	-5	-200*	29	Complementary to 2SC2275	NEC
2SB755 (R, O)	AF, Power amp.	PNP Si-Td	-150	-5	-12A	120W (Tc=25°C)	-150	-50 max.	-150	50 ~ 160	-5	-1A	-2 max.	-5A	-500	20	-10	-1A*	450	Complementary to 2SD845	TOSHIBA
2SC1815 (Y, GR)	AF, General	NPN Si-E	60	5	150	400	125	0.1 max.	60	120 ~ 400	6	2	0.25 max.	100	10	80 max.	10	1*	3 max.		TOSHIBA
2SC2705	AF	NPN Si-E	150	5	50	800	150	0.1 max.	150	80 ~ 240	5	10	1.0 max.	10	1	200	5	10	1.8	Complementary to 2SA1145	TOSHIBA
2SC2275 (P, Q)	AF, Power amp.	NPN Si-E	120	5	1.5A	25W (Tc=25°C)	150	1 max.	120	100 ~ 320	5	300	2 max.	1A	100	200	5	200*	19	Complementary to 2SA985	NEC
2SC2240 (GR, BL)	AF, Low noise	NPN Si-E	120	5	100	300	125	0.1 max.	120	200 ~ 700	6	2	0.3 max.	10	1	100	6	1*	3		TOSHIBA
2SD845 (R, O)	AF, Power amp.	NPN Si-Td	150	5	12A	120W (Tc=25°C)	150	50 max.	150	55 ~ 160	5	1A	2 max.	5A	500	20	10	1A*	200	Complementary to 2SB755	TOSHIBA

DIODES

DEVICE TYPE	APPLICATIONS	STRUCTURE [†]	MAXIMUM RATINGS Absolute-Maximum Values: (TA=25°C unless otherwise specified)								ELECTRICAL CHARACTERISTICS Typical Values: (TA=25°C unless otherwise specified)								MANUFACTURER		
			Reverse Surge Voltage VR _{surge} (V)	Peak Reverse Voltage VRM (V)	Reverse Voltage VR (V)	Peak Forward Voltage VF _M (V)	Peak Forward Current IF _M (mA)	Average Rectified Current IO (mA)	Forward Surge Current IF _{surge} (A)	Junction Temperature TJ (°C)	Total Power Dissipation PD (mW)	Forward Current If _{min} (mA)	Forward Voltage VF _{max} (V)	Forward Voltage VF (V)	Reverse Current IR _{max} (mA)	Reverse Current VR (V)	Test Condition If (mA)	Test Condition VF (V)	Test Condition IR (mA)	Test Condition VR (V)	Others
DS448	Switching	Si-P		35	30		360	120	0.5	175	300				1	50	1	30			SANYO
DS446	Switching	Si-P		105	100		500	200	0.7	175	200				0.65	15	0.1	100			SANYO
LNB1R-CPH	Lamp (orange)	GeAsP			3		40	IF=30			90				2.8	20	.10	3	IV=20 mcd (IF=20mA)		MATSUSHITA
S10VB-20	Rectifier	Si-DJ (Bridge)		200				10A	200	150					1.05		10				SHINDENGEN
W02	Rectifier	Si-DJ (Bridge)			200	200		1.5A	50	125					1.0	1.0A	10		R _{th} =50°C/W		GENERAL INSTRUMENT
GP-10	Rectifier	Si-DJ		100				1A	30	175					1.1	1A	5				GENERAL INSTRUMENT

ZENER DIODES

DEVICE TYPE	APPLICATIONS	STRUCTURE [†]	MAXIMUM RATINGS Absolute-Maximum Values: (TA=25°C unless otherwise specified)				ELECTRICAL CHARACTERISTICS Typical Values: (TA=25°C unless otherwise specified)												MANUFACTURER	
			Total Power Dissipation PD (mW)	Zener Current IZ (A)	Junction Temperature TJ (°C)		Zener Voltage Vz Test Conditions			Differential Resistance Rz Test Conditions			Temperature Coefficient Z Test Conditions			Reverse Current Iz Test Conditions	Reverse Current VR (V)	Others		
			MIN (V)	TYP (V)	MAX (V)	IZ (mA)	TYP (Ω)	MAX (Ω)	IZ (mA)	TYP (%/°C)	MAX (%/°C)	IZ (mA)	MAX (μA)	VR (V)						
RDB.2-EB1	Regulator	Si-J	400			175	7.53	7.92	20		10	20				2	5			NEC
RD13-EB3	Regulator	Si-J	400			175	12.99	13.66	10		25	10				2	10			NEC
RD15-EB2	Regulator	Si-J	400			175	13.89	14.62	10		30	10				2	11			NEC
RD22-EB4	Regulator	Si-J	400			175	21.52	22.63	5		60	5				2	17			NEC

INTEGRATED CIRCUITS NJM4558D/TL4558P

■ APPLICATION: DUAL OPERATIONAL AMPLIFIER

■ MANUFACTURER: JRC (NJM4558D)/Texas Instruments (TL4558P)

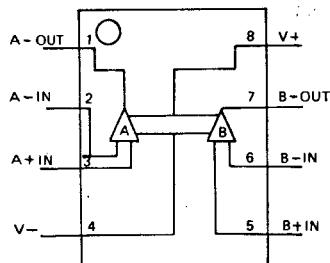
ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	NJM4558D	TL4558P	UNITS
Supply Voltage	V _S	±18	±18	V
Total Power Dissipation	P _T	500	680	mW
Differential Input Voltage	V _{ID}	±30	±30	V
Input Voltage	V _{ICM}	±15	±15	V
Storage Temperature	T _{srg}	-40 ~ +125	-65 ~ +150	°C
Operating Temperature	T _{opt}	-20 ~ +75	-20 ~ +70	°C

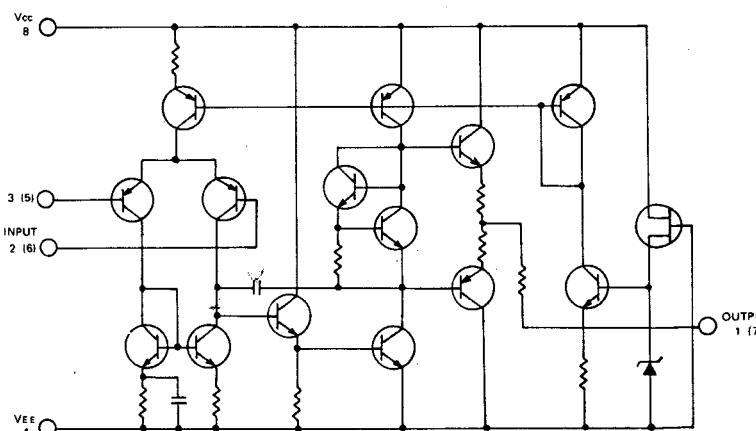
ELECTRICAL CHARACTERISTICS (T_a = 25°C, V_S = ±15V)

ITEM	SYMBOL	CONDITIONS	NJM4558D			TL4558P			UNITS
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Input Offset Voltage	V _{IO}	R _S ≤ 10kΩ			6.0		0.5	6.0	mV
Input Offset Current	I _{IO}			200			5	200	nA
Input Bias Current	I _B			500			40	500	nA
Large-Signal Voltage Gain	A _V	R _L ≥ 2kΩ, V _O = ±10V	86			86	110		dB
Output Voltage Swing	V _{om}	R _L ≥ 10kΩ	±12			±12	±14		V
Common Mode Rejection Ratio	CMR	R _S ≤ 10kΩ	70			70	90		dB
Supply Voltage Rejection Ratio	SVR	R _S ≤ 10kΩ		150		30	150		µV/V
Power Consumption	P _d	both channel		170		75	170		mW

TERMINAL GUIDE (TOP VIEW)



EQUIVALENT CIRCUIT (1/2 CIRCUIT)



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